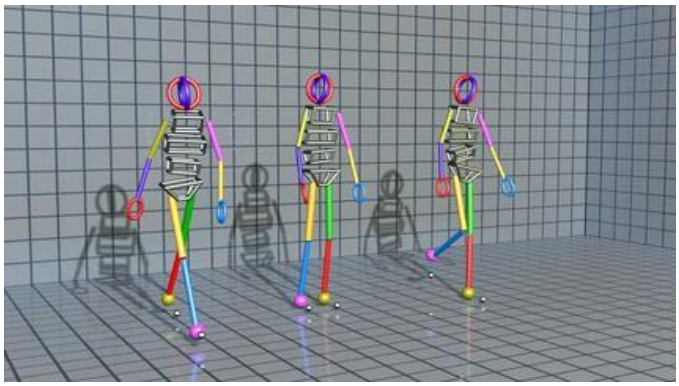
# A.I. Skeletal Tracking Flower



Object detection and motion tracking currently depend on sophisticated algorithms and equipment to be used effectively. However, as artificial intelligence systems improve, these complex tasks are becoming more accessible. As quantum computing further develops to expand the capacity of machine learning, these systems will become increasingly accurate and more useful. In this activity, students will build a system that uses a webcam and a 3D printed flower to allow a user to control the color of the flower (LED) wirelessly through a skeletal tracking program they create using A.I.

This project was adapted from the *Microbit RGB Lamp Controlled with machine learning HandPose* by Lillian Brevik available at https://microbit.hackster.io/lillian-brevik/microbit-rgb-lamp-controlled-with-machine-learning-handpose-699446.

## Components Needed

Micro:Bit V2 with USB cable × 1

ml5.js and p5.js editors and libraries

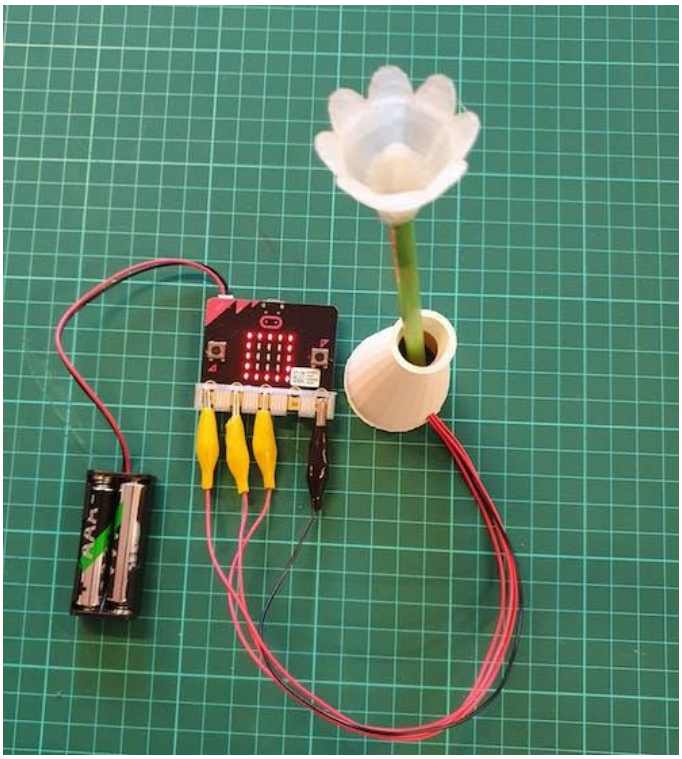
RGB LED, alligator clips, (optional 3D printed flower/stand)

# The Challenge

This project is a great introduction to AI and machine learning with physical computing. Use a micro:bit communicating via Bluetooth with a computer or Chromebook. Lillian Brevik used the Ml5.js and p5.js libraries to program an **app** with Machine Learning. She used Handpose, a machine learning model that allows for palm detection and hand-skeleton finger tracking in the browser, to detect one hand at a time and provide 21 3D hand keypoints that describe important locations on the palm and fingers. This allows a user to point in physical space and for the webcam to identify where the fingers are pointing. We will use the Lillian's app to control our MicroBit and change the colors of the flower's LED.

**Prepare the Micro:Bit**

If you have access to a 3D printer, you can print a small flower (see image below) that holds an RGB (cathode common) LED in the middle of the pedals. Students should be creative with their flower designs! If you don't have a 3D printer, you can do the same activity with construction paper, cardstock, or even cardboard.



Once you have the flower built, place the RGB LED in the proper location and wire it to the MicroBit as shown in the photo. Connect the R, G, and B pins to pins 0, 1, and 2, on the Micro:Bit, and connect the long cathode pin to the GND pin on the MicroBit.

**Coding Your Micro:Bit**

The goal is to connect the Micro:Bit to the computer or Chromebook via Bluetooth and to use the app to send signals that control the color of the LED. You can write this code on your own, but if you stuck, one solution option is shown on the next page.

**Putting it all together**

Once your MicroBit code is set and connected to the computer via Bluetooth, you can use **Lillian's app** (https://lillian-se.github.io/AI_RGB/) to experiment with HandPose and the AI model she built.